Natural Heritage Resources Fact Sheet

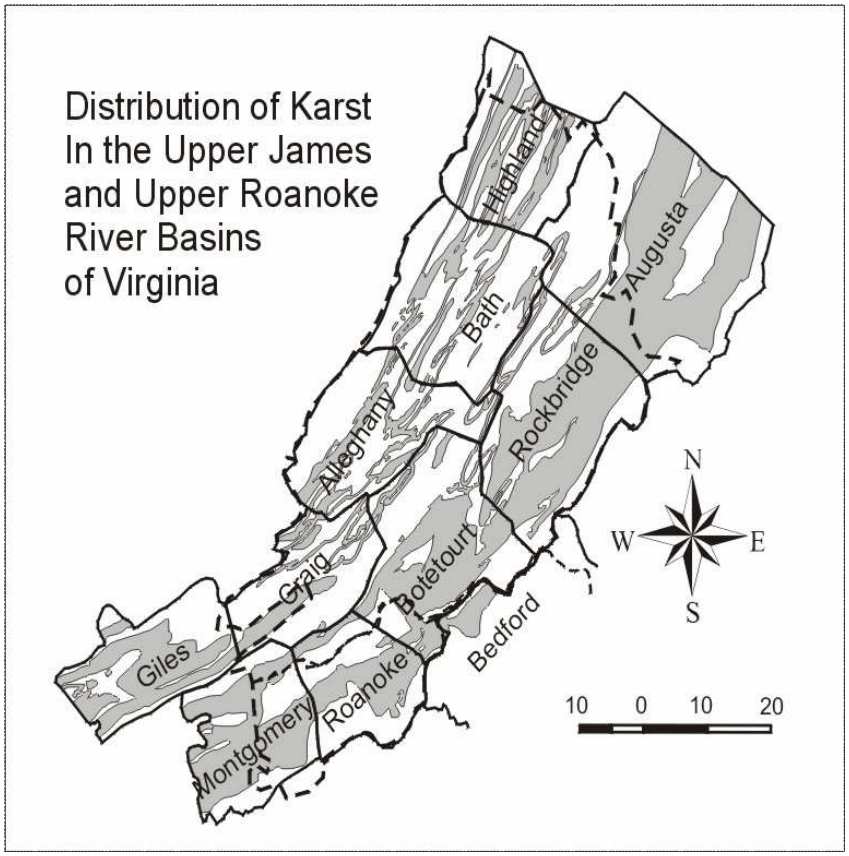
Karst Resources of the Upper James and Upper Roanoke River Basins

The headwaters of the James and Roanoke rivers lie west of the Blue Ridge Mountains in Virginia's Valley and Ridge physiographic province. These watersheds are characterized by ridges composed of sandstone resistant to the forces of weathering and by valleys eroded from carbonate-rich rocks such as limestone, dolomite and softer shale formations. Over geologic time, rainwater made acidic by percolation through soil has dissolved much of the carbonate rock. This resulted in karst topography, with recognizable features such as caves and sinkholes.

Karst is found throughout much of the upper reaches of the James and Roanoke watersheds, especially south and along the Route I-81 corridor. Eight counties and the cities of Roanoke, Salem, Lexington and Covington are within these watersheds. Karst topography presents challenges as these communities grow.

Much of the region's water flows underground through caves and emerges at large springs along streams and rivers. Surface streams often sink to become part of the groundwater system. Physical connections and rapid interactions between surface water and groundwater in karst areas make karst aquifers very vulnerable to water pollution. Contaminants are transported readily by streams into the groundwater due to land use practices such as sinkhole dumping and sometimes by transportation accidents and chemical spills. Karst landscapes are also susceptible to problems caused by nonpoint source pollution, including excessive application of fertilizers and pesticides, improper erosion and sediment control practices, and direct access for livestock to surface steams. Springs and wells used to supply public and domestic drinking water are easily contaminated.

Virginia has more than 4,300 known caves; a little more than 1,000 are in the upper James and upper Roanoke river basins. While most caves have some importance, a cave designated *significant* meets special criteria such as exceptional length or depth, the presence of rare species or ecosystems, or an abundance of beautiful mineral formations. Significant caves may be economically important, as is the case with Virginia's show caves. Nearly 400 Virginia caves are significant because of biologic, geologic, scenic or other special attributes. Fifty-four significant caves are in these particular watersheds. Virginia's caves and karstlands provide habitat for many unique cave-adapted organisms. The Virginia Department of Conservation and Recreation (DCR) tracks more than 100 occurrences of 50 such rare, cave-adapted species within these two watersheds. Most of these species are invertebrates, including eight beetle species, nine species of springtail (an insect), 14 crustacean species (eight amphipod and six isopod), five species of millipede and three spider species.



The Madison Cave isopod (*Antrolana lira*) is listed as threatened, thus is protected under federal and state endangered species acts. The centimeter-long, free-swimming subterranean crustacean is known to exist in only the Great Valley of Virginia and West Virginia. Scientists believe it evolved from a marine ancestor that swam into the karst aquifer millions of years ago when the sea level was higher.

Seven species of bats live in the caves of the upper James and upper Roanoke river basins. Two of them, the Indiana bat (*Myotis sodalis*) and the Virginia big-eared bat (*Corynorhinus townsendii virginianus*), are listed as endangered under the federal Endangered Species Act. The Eastern small-footed bat (*Myotis leibii*), also found in the watersheds, is considered rare but is not federally listed. Bats control pest insects and are generally harmless to humans.

DCR
Virginia Department of Conservation & Recreation

For more information, contact:
Department of Conservation and Recreation, Virginia Karst Program

(804) 786-7951; www.dcr.virginia.gov/natural_heritage/index.shtml
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Cave Protection Act

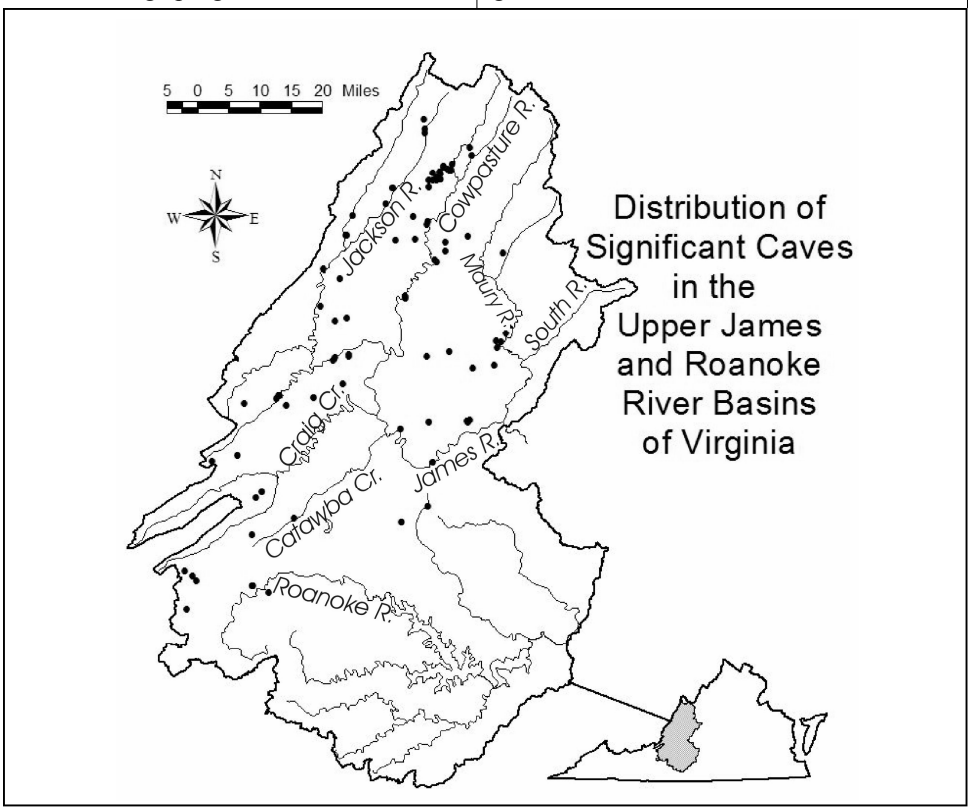
The Virginia Cave Protection Act acknowledges the unique and irreplaceable nature of caves, their special habitats, their historic and cultural value, and their other special attributes. It recognizes the role caves play as conduits for groundwater as well as their vulnerability to pollution. DCR is committed to conserving, protecting and enhancing all of the state's natural resources, including Virginia's caves and karst. The Virginia Cave Board is a governor-appointed citizen board within DCR. The board educates citizens and helps state, federal and local governments, private organizations and individuals conserve and protect Virginia's cave and karst resources.

DCR's Natural Heritage Program supports protection of Virginia's caves and karst through inventory and information management, land conservation and land management. The program is a part of NatureServe, an international network of natural heritage programs that tracks rare biological elements for environmental planning and in support of state environmental review process. Every year DCR reviews and comments on hundreds of projects on karst terrain, working with local governments, citizens and state and federal agencies to find solutions that balance competing demands on these resources. DCR proactively engages in projects to define karst groundwater basins, perform biological investigations and monitoring in caves, and help develop and promote best management practices that protect Virginia's caves and karst resources. DCR provides karst-related technical assistance to various state, federal and local government agencies and to organizations, professionals and private citizens.

Project Underground, an educational program that promotes a better understanding of caves and karst, is a cornerstone of DCR's karst conservation effort. Through this nationally recognized program, thousands of students and citizens throughout the commonwealth each year learn the special values and sensitive nature of karst.

DCR also manages stormwater runoff, erosion, sediment and nutrient management programs to reduce nonpoint source pollution that may be detrimental to karst resources. The agency works with local soil and water conservation districts to help landowners use best management practices that conserve natural resources and protect the environment. Residents of the upper James River and upper Roanoke river basins benefit from numerous DCR programs.

People in this area are fortunate to live in a relatively unspoiled area. The rolling landscape in the valleys beneath the mountain ridges adds much to the area's natural beauty. The land is rich with natural resources, such as abundant, clean groundwater. The karst aquifers that hold much of the groundwater are, however, easily contaminated by thoughtless actions. Generations of Virginians have inhabited these hills and valleys for many years. This generation and its descendents can care for the land, air and water by managing these special resources for the long-term.



You can help

Here are a few ways to protect fragile karst in the area. Do not dump trash into sinkholes. Manage stormwater runoff to prevent sediment pollution, and improve water quality by using vegetated filter strips and stream buffers. Develop alternate water sources for livestock and fence cattle away from streams and sinkhole ponds. Develop a nutrient management plan to apply only the fertilizer your plants need. Help friends and neighbors better understand and appreciate their stake in maintaining a sustainable, quality environment, and to protect caves and other karst resources in the upper James and upper Roanoke river basins now and for future Virginians.

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